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FAO Fisheries Reports No. 11 FIt/R11 (En)

REPORT OF THE

SECOND WORLD FISHING GEAR CONGRESS

LONDON, 25 - 31 MAY 1963

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
ROME, 1963

FAO FISHERIES REPORTS

This is the eleventh in a series of reports of meetings, surveys and other activities of FAO Fisheries Division. Documents in this series are:

FIt/R1	(En)	Report of the international conference on fish in nutrition	1962
FIt/R1	(Fr)	Rapport de la conférence internationale sur le rôle du poisson dans l'alimentation	1962
FIt/R1	(Es)	Informe de la conferencia internacional sobre el pescado en la alimentación	1962
FIe/R2	(En)	Report on the meeting of an expert panel on fish meal and fish flour for human consumption	1962
FIe/R2	(Fr)	Rapport sur la réunion d'experts sur les farines grossières et farines fines de poisson pour l'alimentation humaine	1962
FIe/R2	(Es)	Informe de la reunión del cuadro de expertos sobre la harina de pescado para el consumo humano	1962
FIe/R3		Requirements and improvements of fishery statistics in the North Atlantic region	1962
FIt/R4		Report of the FAO/EPTA regional training centre on fish processing technology, 6 March-14 April 1961, Quezon City, Philippines (provisional edition)	1962
FIe/R5		Economic effects of fishery regulation	1962
FIb/R6.1	(En)	Proceedings of the world scientific meeting on the biology of tunas and related species	1963
FIb/R6.1	(Fr)	Actes de la réunion scientifique mondiale sur la biologie du thon et des espèces voisines	1963
FIb/R6.1	(Es)	Actas de la reunión científica mundial sobre biología del atún y especies afines	1963
FIe/R7		Report of the third session—continuing working party on fishery statistics in the North Atlantic area	1963
FIe/R8		Landing and marketing facilities at selected sea fishing ports (provisional edition)	1963
FIt/R9		Standards and requirements for fish handling, processing, distribution and quality control	1963
FIe/R10		Proceedings and basic working papers of the technical meeting on fishery co-operatives, Naples, 12-21 May 1959	1963
FIt/R11	(En)	Report of the second world fishing gear congress, London, 25-31 May 1963	1963
FIt/R11	(Fr)	Rapport du deuxième congrès mondial des engins de pêche, Londres, 25-31 mai 1963	1963
FIt/R11	(Es)	Informe del segundo congreso mundial de artes de pesca, Londres, 25-31 mayo 1963	1963

Unserialized reports dated earlier than January 1962 are listed in the FAO Catalogue of Fisheries Publications and Documents (1962). Certain unserialized reports may be reprinted in this series as the unserialized versions go out of print.

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REPORT OF THE

C O N T E N T S

	Page
Organization	1
Conduct of the Meeting	1
Summary of the Discussions	2
Acknowledgements	6
Appendices:	
I Agenda and Program	7
II List of Papers	9
III Introductory Addresses	15
IV Officers of the Meeting	20
V List of Participants	22

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ORGANIZATION

Whereas the first FAO Fishing Gear Congress in 1957 covered virtually all aspects of fishing gear technology, the agenda for the second Congress (Appendix I) was more selective and concerned only a limited number of subjects which were felt to be of maximum current interest.

The meeting was open to all persons connected with official fisheries services and institutions, as well as to interested persons from private industry.

Invitations were sent out from the Director-General's office to all FAO member governments. Invitations were also sent to the participants of the previous Fishing Gear and Fishing Boat Congresses, as well as to other FAO contacts known to be interested in the subject matter. Several press releases were distributed to hundreds of fisheries periodicals throughout the world, publicising the Congress and its agenda.

A selected number of authorities on the various subjects covered by the agenda were invited to submit written contributions. Eighty-seven papers were accepted and printed, fifty of which were distributed in advance so that participants could prepare themselves to contribute to the discussions and to exchange information and experience. The remainder were distributed on registration of the participants in London. Papers were written in one of the FAO official languages (English, French and Spanish) and each contained an abstract in all three languages. Appendix II gives a complete list of the papers.

The success of the Congress was largely due to the splendid co-operation, accommodation and services provided by Her Majesty's Government.

FAO contemplates holding the Third FAO World Fishing Gear Congress in 1969.

CONDUCT OF THE MEETING

The Congress was opened at 10:30 a.m. on 27 May 1963. Dr. D. B. Finn, Director, Fisheries Division, FAO, acting as the representative of the Director-General, outlined some of the problems which hinder the development of fisheries and which can only be solved by international cooperation. Lord St. Oswald, M. C., Joint Parliamentary Secretary to the Ministry of Agriculture, Fisheries and Food, welcomed the participants and emphasized the importance Her Majesty's Government gave to the fishing industry. Dr. Finn then handed the chair to Mr. L. M. Harper Gow, M. B. E., Director of Chr. Salvesen & Co. Ltd. of Leith, who pioneered modern stern trawling factory ship operations, and who had been elected the General Chairman of the Congress (Appendix III).

The technical sessions started immediately after the opening ceremony, and the timetable set out in the program was closely followed (Appendix I). As there were only four and a half days available for discussions there was not sufficient time to allow the authors to read their papers in full; instead specially appointed rapporteurs briefly reviewed all written contributions having a bearing on the agenda item under discussion, bringing out the main points of interest and/or controversy. The session chairmen and rapporteurs of the meeting are listed in Appendix IV.

The Congress was attended by 673 participants from 49 countries and four international organisations (Appendix V).

The entire proceedings were recorded in the original language on magnetic tape. The papers and proceedings will be published in book form by Arthur J. Heighway Publications Limited, as a companion volume to Modern Fishing Gear of the World which resulted from the first FAO Fishing Gear Congress (1957). The present report is being distributed in the three official FAO languages to all FAO member governments, together with one complete set of the written contributions in the original language in which they were submitted, with abstract in the three official FAO languages.

SUMMARY OF THE DISCUSSIONS

1. MATERIALS

1.1 Netting twines: Standardization of terminology and numbering systems

During the first FAO Fishing Gear Congress (1957) a working party was established to recommend a unified international numbering system for netting twines. In its report, this working party recommended the tex system (used also in the textile industry) as the simplest and most practical system.

This tex system, based on metric values (weight in gr/1000 m), has in the meantime also been recommended by the International Standardization Organization. For fisheries purposes total tex has been recommended. This latter value can be applied to all twines, whether they be twisted, braided or plaited.

Apparently there was general agreement that the tex system applied to fishing twines would simplify the placing of orders and recognition of twine sizes for netmakers and fishermen of different nationalities.

1.2 Standardization of testing methods

The results obtained when testing the properties and dimensions of fishing twines and ropes, depend on the testing methods used and are, therefore, often not comparable. During the first Fishing Gear Congress a working group was set up to investigate the possibility of creating an international standard system for testing fishing materials. The proposals of the working group are explained in Paper No. 12. Comments from the floor showed general agreement with the proposals.

1.3 New net materials

Since the first Fishing Gear Congress, polyethylene has become established as a trawl twine material, and thus joined the ranks of the other important synthetics,i.e. polyamid, polyester and vinylon, while polypropylene has made its appearance over the last year or so. Braided twines are now being used more and more in, for instance,trawls. It was suggested that much more use could be made of plastics in fisheries (at present mainly confined to floats), such as for the construction of traps and auxiliary gear.

1.4 Lines and ropes
1.5 Knotless nets
1.6 Monofilament nets

These three points were treated together because of their close connection in the construction of fishing gears. The main discussion turned around the different types of knotless nets and the influence of the construction and meshsize of the net. Recent progress was reported in the construction of Raschel-type knotless nets,of which the mesh strength was almost the same in all directions. An indication of the vast development in the use of knotless nets can be gleaned from the fact that Japan presently uses 1,600 tons per year of knotless webbing, and plants are being built in all parts of the world for producing small-meshed netting which is said to have an appreciable price advantage over knotted webbing.

The discussion showed that whereas monofilament nets were extensively used in inland fisheries their application to marine fisheries was still lagging. On the other hand, it was brought forward that in certain fisheries their catch was several times higher than that of multifilament nets.

2. GEAR AND FISHING

2.1 Stern trawling

The advantages of stern trawling with large vessels are now generally accepted, and efforts have lately been directed towards adapting stern trawling arrangements to smaller vessels. The papers presented to the Congress summed up the advance made in overcoming the difficulty of the much shorter deck space for hauling the gear, and several possible solutions were proposed.

An animated discussion developed concerning the pros and cons of tiltable gantries, ramps and other methods, and showed clearly that no standard method of operating trawls over the stern from small vessels had yet emerged.

2.2 Bottom trawling with high-opening nets, or low- and wide-opening nets

The large number of papers dealing with this subject showed that the bottom trawling net has changed very little over the years, although much progress has been made in shearing and uplifting devices.

The outstanding fact that emerged from this discussion was that gear technology has reached the stage where one can construct the gear to operate according to specifications but this does not always lead to improved catches beyond what was previously obtained with traditional gear, as too little is known of the behaviour of fish in respect of the gear. This limits ability to correctly specify the gear.

Major attention has in the past been paid to increasing headline height of ground trawls in the hope that this would increase catches.

2.3 Midwater trawling

This was one of the main subjects on the agenda, with eight papers dealing directly with midwater trawling and a number of others indirectly concerned. While several showed advances made in the development of one-boat midwater trawl gear, covering the construction of gear as well as monitoring its position in relation to fish schools by echo-sounding devices, the discussion showed that one-boat midwater trawling has not yet come of age and, although some advance has been made, this method of fishing has at present found only very limited commercial application. In recent research emphasis has been mainly on increasing size of the net mouth, use of larger trawl boards, and in moving these further away from the net. Among the great variety of telemeters for controlling the net depth, the cable-connected headline transducer seems to be the most commonly used.

Promising results have lately been obtained with catching certain species of fish in their less active pre-spawning and spawning phase, while difficulties are still encountered with active, non-spawning clupeoids. In future more emphasis needs to be placed on the development of improved techniques for observing the fish from the moment the vessel passes over the school until the trawl arrives. This may possibly be achieved by narrow-beam echo-ranging equipment, possibly with automatic depth calibration. The discussion further showed clearly that there is a need for closer international co-operation and pooling of experience and ideas among the workers in this field.

2.4 Gillnetting
2.5 Longlining
2.6 Traps, pots and dredges

These three subjects were dealt with jointly during one session.

Gillnets are still one of the most important fishing gears in many parts of the world, and are now mostly made of synthetic fibres which greatly enhance their fishability. The discussion on gillnets mainly centered around the use of monofilament, in view of the low visibility of such nets, and the mechanised handling of the nets and catch.

In the field of pots and traps for fishing, advances have mainly been concerned with the use of non-rotting plastic materials in the construction of this gear, as well as the introduction of better labour-saving hauling devices.

2.7 Purse seining
2.8 Deck machinery
2.9 Controls

Since the first FAO Fishing Gear Congress, the power block has become standard equipment in all major purse seine operations. The development of the enormous tuna purse seines presently used is largely due to the use of the power block. The most recent development in purse seining, however, is the asdic-guided operation on submerged schools. The discussions were mainly concerned with this technique and showed that the method is already highly developed in the Icelandic herring fisheries.

The discussion on centralised and remote control brought forward the fact that, while it was technically possible to mechanise, automise and conduct virtually all operations by remote control, there is a limit to the number of things a skipper himself can observe and control. Furthermore, the automation must be economic.

2.10 Fish detection

The development of echo-sounding instruments over the last several years has not been as rapid as that of the echo-ranging equipment. A major advance in echo sounding is perhaps the bottom-locked display. The new sounding and ranging equipment which is now appearing on the market is highly complex in operation and in interpreting the signals received, so that better training of the fishermen in the operation of such instruments is now highly necessary.

2.11 Fleet operations

As the near-water fishing grounds have become over-exploited, fishing has to be conducted further and further from the home base. Several papers presented to the Congress reported on fleet operations under varied fishing and economical circumstances. The discussions centered mainly around the vast use made of fishing fleets by the Japanese and the Russians compared with other nations, and the Spanish operation of a fleet of trawlers off South America and South West Africa, the catches being shipped to Spain by cargo vessels.

The transfer of catches from catcher boats to mothership and from mothership to transport vessel does not appear to cause serious difficulties.

3. GEAR RESEARCH

3.1 Mechanical and hydrodynamic theory
3.2 Instrumented gear testing

Many recording and measuring instruments for underwater use have been developed and now allow the investigation of the behaviour of almost any part of the gear in action.

3.3 Fish behaviour studies

A number of the papers presented dealt with fish behaviour studies and showed that the scientists and technologists concerned have in recent years transferred their experiments and observations more and more away from the laboratory tanks and are increasingly studying the fish in their natural habitat.

Throughout the discussions on previous items the need for more knowledge on fish behaviour was brought forward. In fact, there was a clear indication that progress in many instances was limited by the lack of knowledge of fish reactions to the approaching gear.

3.4 Application to fisheries of recent advances in telemetry, computer science, etc.
3.5 Future outlook. Gaps to be filled in gear research

Fishing is becoming more complex every day. Already some of the biggest fishing firms have started using electronic computers and the application to fisheries of various military and space developments is not as far-fetched as might appear. Highly sensitive equipment, developed for naval purposes, enables study of fish sounds, and knowledge gained through such studies may well open up new possibilities of detecting, attracting or herding fish acoustically. Magnetic tapes with fish sounds, characteristic for each of several different species, were played at the Congress. Using unmanned sonobuoys for monitoring the presence of fish and transmitting radio signals to computer-equipped data processing centres could help plot patterns of fish distribution and guide vessels to rich fishing areas. These and several other future prospects outlined in Paper No. 9 might seem fantastic at first sight, but are really well within the realms of possibility.

Electro-fishing in conjunction with traditional gear such as trawls and purse seines, or combined with pumping, light attraction, etc., has long been the object of much speculation, but so far it has found hardly any application in commercial fishing. No doubt, one reason for this is the great expense involved in such experimentation at sea which has prevented most national fisheries institutes from conducting field trials. International co-operation was advocated at the Congress.

Training facilities for gear technologists exist only in two or three countries, and only a few gear research institutes have been established as yet. At the same time the fishing industry in the developed countries is feeling the squeeze from other industries and must modernise to cut costs and improve productivity. Experience shows that integrated team approach is needed to obtain more rapid advances than have been achieved in the past by each working in his own corner.

In the years to come, gear technology must pay more attention to fish behaviour studies on the one hand and on the other hand it must also concern itself with techno-economic studies leading to better evaluation of costs and earnings in fishing. Fishing has become too complex and too highly capitalised to rely on intuitive judgement to the same extent as in the past.

ACKNOWLEDGEMENTS

The Organization wishes to extend its grateful thanks to Her Majesty's Government in the United Kingdom for graciously acting as host to the Congress which was held in London. Church House, Westminster, provided excellent facilities as headquarters of the Congress and offices for the Secretariat.

The Ministry of Agriculture, Fisheries and Food, and the Foreign Office generously placed their services at the disposal of the Secretariat; in particular, the Fisheries Division of the Ministry of Agriculture, Fisheries and Food are to be congratulated on the efficient conduct of the local administrative arrangements in regard to the Congress as well as the planning of a varied and enjoyable social program.

Participants greatly appreciated the generous hospitality offered by Her Majesty's Government at Lancaster House and the unforgettable reception given at the Guildhall by the Corporation of the City of London. Warmest thanks are also due to those firms and organizations who so lavishly entertained the participants, corporately or individually, throughout the week:

Arthur J. Heighway Publications Ltd.
Billingsgate Market
British Celanese Ltd.
British Nylon Spinners' Association
British Trawlers' Federation
Decca Navigator Co.Ltd.
French Embassy
Imperial Chemical Industries Ltd.
Industrial Newspapers Ltd.
Kelvin Hughes Division of S.Smith and Sons (England)Ltd.
National Physical Laboratory, Ship Division
Port of London Authority
Selfridges Ltd.

Members of the Women's Voluntary Service (WVS) kindly organized and staffed a Messages and Information Desk in the Hoare Memorial Hall, Church House, where morning coffee and afternoon tea, provided by the Host Government, were served to the participants.

Through the courtesy of World Fishing, each participant was given a complimentary ticket to the First World Fishing Exhibition which was held at Earl's Court concurrently with the Congress and which provided an opportunity for participants to see the latest improvements and innovations in fishing materials and equipment.

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Appendix I

AGENDA AND PROGRAM

SATURDAY, 25 May

14.00 - 19.00 Advance registration (Church House)

MONDAY, 27 May

08.00 - 10.30 Registration
10.30 - 11.00 Opening ceremony
11.00 - 12.00 Technical session

Agenda items:

1. Materials

1.1 Netting twines: Standardization of terminology and numbering systems
1.2 Standardization of testing methods

14.00 - 18.00

1.3 New net materials
1.4 Lines and ropes
1.5 Knotless nets
1.6 Monofilament nets

TUESDAY, 28 May

09.00 - 12.00

2. Gear and Fishing

2.1 Stern trawling
2.2 Bottom trawling with high-opening nets, or low- and wide-opening nets

14.00 - 18.00

2.3 Midwater trawling

WEDNESDAY, 29 May

09.00 - 12.00

2.3 Midwater trawling (continued)
2.4 Gillnetting
2.5 Longlining
2.6 Traps, pots and dredges

Afternoon Excursions, visit to First World Fishing Exhibition, etc.

THURSDAY, 30 May

09.00 - 12.00

2.7 Purse seining
2.8 Deck machinery
2.9 Controls
2.10 Fish detection

2.10 Fish detection (continued)
2.11 Fleet operations

FRIDAY, 31 May

09.00 - 12.00

3. Gear Research

3.1 Mechanical and hydrodynamic theory
3.2 Instrumented gear testing

14.00 - 17.30

3.3 Fish behaviour studies
3.4 Application to fisheries of recent advances in telemetry, computer science, etc.

3.5 Future outlook. Gaps to be filled in gear research

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Appendix II

LIST OF PAPERS

Paper No.	Author and Title	Agenda Item
1	Richard L. McNEELY Development of the Cobb pelagic trawl - A progress report	2.3
2	Chikamasa HAMURO Development of an improved otter trawl gear	2.2 3.2 (1.3) (1.5) (2.1)
3	Tasae KAWAKAMI The theory of designing fishing nets and testing them in model	3.1
4	J. FONTAINE Echo ranger for fish schools	2.10
5	G.H. ELLIS, P.R. HOPKIN and R.W.G. HASLETT A comprehensive echo sounder for distant-water trawlers	2.10
6	H. MOHR Eel traps made of plastic	2.6 (1.3)
7	Kyotaro KAWAGUCHI, Masakatsu HIRANO and Minoru NISHIMURA Echo-sounder measurement of tuna longline depth	2.5 (2.10) (3.2)
8	Conrad BIRKHOFF The sterntrawler - A decade's development in trawl handling	2.1
9	Dayton L. ALVERSON and Norman J. WILIMOVSKY Prospective developments in the harvest of marine fishes	2.12 3.2 (3.4)
10	Hiroshi TOMINAGA Mothership bottom longline fishery	2.5 2.11 (1.3)
11	NIPPON SUISAN KAISHA LIMITED Mothership fishing for crab	2.11 (1.3) (2.4)
12	Edited by: A. v. BRANDT Revised by: P.J.G. CARROTHERS Test methods for fishing gear materials (twines and netting)	1.2

(The figures in brackets indicate related agenda items)

Paper No.	Author and Title	Agenda Item
13	Gerhard KLUST Standardization of terminology and numbering systems for netting twines	1.1
14	Goro OKABE Tuna longline mothership fleet operations	2.11 (2.5)
15	Masatake NEO Japanese salmon mothership fishery	2.4 2.11 (1.3) (1.6)
16	Chihiro MIYAZAKI Driftnet haulers for salmon fishing	2.4 (2.8)
17	Eldon NICHOLS Suggestions for improved heavy trawl gear	2.2
18	Tomiju HASHIMOTO, Yoshinobo MANIWA, Osamu OMOTO and Hidekuni NODA Echo-sounding through ice	2.10
19	Tomiju HASHIMOTO and Yoshinobu MANIWA Frequency analysis of marine sounds	2.10 3.3 (2.12)
20	Minoru NISHIMURA Echo detection of tuna	2.10
21	H. MOHR Reaction of herring to fishing gear studied by means of echo sounding	2.3 3.3 (2.10)
22	Chikamasa HAMURO and Kenji ISHII Some Japanese instruments for measuring fishing gear performance	3.2
23	Chikamasa HAMURO and Kenji ISHII Underwater telemeters for midwater trawls and purse seines	2.3 2.10 (3.2)
24	Hiroshi TOMINAGA Fleet trawling operations	2.2 2.11 (1.3)
25	Norvald MUGAAS Knotless netting in the Norwegian fisheries	1.5
26	Rolf STEINBERG Two-boat midwater trawling for herring with bigger boats	2.3 (2.10)
27	D.G. TUCKER and V.G. WELSBY Sector-scanning sonar for fisheries purposes	2.10 (2.2) (2.3) (2.7)
28	Arsenio N. ROLDAN, Jr. and Santos B. RASALAN Types of Philippine fish corrals (traps)	2.6

Paper No.	Author and Title	Agenda Item
29	Santos B. RASALAN A new fish trap used in Philippine waters	2.6
30	H.E.H. PAIN Advances in centralised control and automation	2.9 (2.1) (2.2) (2.3)
31	C.C. KLOPPENBURG and J. REUTER Ropes of polyethylene monofilaments	1.4 (1.3)
32	S. OKONSKI Universal one-boat midwater and bottom trawl	2.3 (3.2)
33	Charles M. FUSS, Jr. Shrimp behavior as related to gear research and development	3.3
34	Vito FODERA The Mediterranean and Atlantic tuna traps	2.6
35	Fredrick WATHNE The development of electrical shrimp trawling gear	2.2 3.3
36	W. HENSTEAD and D.F.C. EDE Monofilaments in fishing	1.6 (1.3)
37	A. v. BRANDT Tests on knotless Raschel netting	1.5
38	Iwao TANI Japanese fish netting of synthetic fibres	2.2
39	E.A. BEST Identifying Pacific coast fishes from echo-sounder recordings	2.10
40	John J. MAGNUSON Tuna behavior research program at Honolulu	3.3 (2.7)
41	Katsuji HONDA and Shigeru OSADA Polypropylene twines in Japan	1.3
42	A. COLLART Evolution of light fishing in the African lakes	3.3
43	Chikamasa HALURO Towing power, towing speed and size of bull trawl	2.2 3.2
44	E.C.B. CORLETT Some small stern trawlers	2.1 2.8 (2.9)

Paper No.	Author and Title	Agenda Item
45	J. SCHARFE One-boat midwater trawling in Germany	2.3 (2.2) (2.10) (2.12) (3.2) (3.3)
46	A. v. BRANDT Fishing methods and gear research institutes: their organization and scope	3.1 3.2 3.3
47	Dennis ROBERTS Ross Daring - Experiment	2.1 2.8
48	J.N. CARRUTHERS Trawl studies and currents	3.2 (2.2) (2.3) (2.4)
49	TRAN-VAN-TRI and HA-KHAC-CHU The use of nylon monofilament in the Viet-Nam fisheries	1.6 (2.4)
50	Conradin O. KREUTZER Utilization of fish reactions to electricity in commercial sea fishing	3.3 (2.2) (2.3) (2.7)
51	Keith A. SMITH The use of air-bubble curtains as an aid to fishing	3.3
52	JAPAN CHEMICAL FIBRES ASSOCIATION Synthetic fibre fishing nets and ropes made in Japan	1.3
53	J. VERHOEST and A. MATON Double-rig shrimp beam trawling	2.2 (2.8) (2.9)
54	V. PAZ-ANDRADE The Spanish South Atlantic fisheries	2.11
55	C.L.B. CARTER and K. WEST The use of Ulstron polypropylene in the fishing industry	1.3
56	Mario DAMIANI Knotless fishing nets produced on Raschel equipment in Italy	1.5
57	W. DICKSON Some comparative fishing experiments in trawl design	2.2
58	Kentaro HAMASHIMA An experiment on the dispersion of chum	3.3
59	W. DICKSON Performance of the Granton trawl	3.2 (2.2) (3.1)

Paper No.	Author and Title	Agenda Item
60	P. DALE and S. MOLLER The development of a midwater trawl	3.1 3.2 (2.2) (2.3)
61	Yoshinori SHIMOZAKI Production and characteristics of synthetic nets and ropes in Japan	1.3 (1.4) (1.6) (2.2) (2.4) (2.6) (2.7) (3.3)
62	Robert F. ALLEN King crab pot fishing in Alaska	2.6 2.8 (2.9)
63	Jürgen DETHLOFF Problems of electro-fishing and their solutions	3.3
64	D.W. LERCH The application of hydraulic power to fishing gear	2.8 (2.1) (2.4) (2.5) (2.6) (2.7) (2.9)
65	P.R. CREWE Some of the general engineering principles of trawl gear design	2.2 3.1 3.2
66	Robert LENIER Detection and location of fish schools	2.10 (3.3)
67	G. VESTNES Sonar instruction courses for fishermen	2.7 2.10
68	T.S. GERHARDSEN A new sonar system for marine research purposes	2.10 (2.3) (2.7)
69	J.H.S. BLAXTER, B.B. PARRISH and W. DICKSON The importance of vision in the reaction of fish to driftnets and trawls	3.3
70	C.J. CHAPMAN The importance of mechanical stimuli in fish behaviour, especially to trawls	3.3 (2.2) (2.3) (2.4)
71	A.I. TRESCHEV Development of Soviet trawling techniques	2.2 (2.1) (2.8)
72	P.A. KURAPTSEV Mechanization of driftnet fishing operations	2.4 2.8
73	J. NICHOLLS Trawl gear instrumentation and full-scale testing	3.2 (2.2) (2.3)
74	E.V. SHISHKOVA Study of acoustical characteristics of fish	2.10

Paper No.	Author and Title	Agenda Item
75	Francesco PIANAROLI Breaking strength of knotless webbing	2.10
76	S.S. TORBAN The complex mechanization of beach seining	2.8
77	I.V. NIKONOROV Pump fishing for saury with light and electric current attraction	3.3
78	Maurice BOMBEKE Study on the drag and abrasion of fishing twines	1.3 1.4
79	Jakob JAKOBSSEN Recent developments in Icelandic herring purse seining	2.7 (2.8) (2.10)
80-A 80-B	FAO fishing gear catalogue	2
81	Gerhard KLUST Netting twines made of polypropylene and polyamide: a comparison of their properties	1.3
82	R. STEINBERG Monofilament gillnets in freshwater fishing: experimental and practical results	1.6 2.4 (3.3)
83	G. FREYTAG Bio-acoustical detection of fish: possibilities and future aspects	2.10 3.3
84	Janusz ZAUCHA New synthetic materials for herring driftnets used in the North Sea	1.3 2.4
85	Benjamin F. LEEPER Automatic data processing and computer application to fisheries	3.4
86	Ronald POWELL Dropline fishing in deep water	2.5 (3.3)
87	B. B. PARRISH and J. H. S. BLAXTER Some notes on the importance of biological factors in fishing operations	3.3 (3.1)

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Appendix III

INTRODUCTORY ADDRESSES

1. DR. D.B. FINN Director, Fisheries Division
representing the Director-General of FAO.

Mr. Chairman, My Lord, Distinguished Members of the Congress,
Ladies and Gentlemen:

The Director-General of the Food and Agriculture Organization, Dr. B.R. Sen, has asked me to represent him in the opening of this Second World Fishing Gear Congress. May I, on his behalf, extend greetings to you and express his satisfaction at the fine response which your presence here attests.

Were it not for other pressing matters in connection with the World Food Congress under the Freedom-from-Hunger Campaign, which as you know meets in Washington on 4 to 18 June, I am sure he would have liked to be here in person.

This not being possible, the Director-General has asked me to convey his gratitude to Her Majesty's Government for their generous invitation to hold this Congress in London and for all these facilities which the Government have placed at our disposal.

I would particularly like to thank the Fisheries Secretary, Mr. Hugh Gardner, and his officers for the very splendid cooperation and help in securing these fine premises and services. They must take a great deal of credit for the success which I am sure this Congress will achieve.

I must also thank Mr. Arthur Heighway whose energetic help has assisted us very greatly.

I am sure we are all greatly honoured by Mr. Harper Gow's acceptance of the General Chairmanship of this Congress. Mr. Harper Gow is well known to us all, especially for the pioneering work which he did on the modernisation of trawling. If I might say so, Sir, imitation is the sincerest form of flattery. It would seem that the principal fishing countries in the world have all offered you this kind of tribute.

The first Fishing Gear Congress was held in Hamburg in 1957 and gave rise to the book which I am sure is well known to you all, Modern Fishing Gear of the World. During the six years that have elapsed, a great deal of progress has been made. Work has been intensified on the perfecting of existing methods by improving synthetic fibres, design of nets, design of boats and hauling gear.

Much progress has also been made in the adaptation of the results of military and space research to the purposes of echo-sounding and echo-ranging. Surprising results are being obtained through miniaturization of apparatus and the employment of high-frequency transducers, all of which are made more economical than the machines which were available even a few years ago. This means that they are much more widely used. More and more fish are being located with a precision which, in the past, was impossible.

I am sure the papers being presented to you during this meeting on these subjects will be very interesting and useful. A great deal has been learned by the fishing gear institutes such as those in the Federal Republic of Germany, Japan, U.S.S.R., Poland, and Government research in the U.S.A., Canada, the United Kingdom, and others who are dealing with the hydrodynamics and the design, you might say the physics, of the gear.

We have received a series of most impressive papers from the United Kingdom which are based upon the studies made by an integrated team on trawl performance and design. This is financed by the White Fish Authority, Her Majesty's Government, and the British Trawlers' Federation. The work involves cooperation between Saunders-Roe and its Hydrodynamics Department and the Fisheries Laboratories. The work, which includes hydrodynamics, modeltesting, structural engineering, instrumentation design, and electronic equipment, has helped to establish or confirm the general engineering principles upon which good gear design depends.

Much as we have learnt and are learning about the applied physics of the gear, it must be remembered that this is not the only problem.

In many cases the limiting factor is our ignorance of the behaviour patterns of the fish itself. Much more must be known about this before we can be as effective as we might be. In fact, it is because we do not know enough about the way fish behave that often prevents us from using midwater trawls efficiently.

This matter of behaviour is, of course, a biological study -- and moreover it must be done in the place where fish live -- under water. This makes the work much more complicated and expensive and more difficult to get scientists. But it is being undertaken. Special submarines -- submersible laboratories -- and diving equipment are being designed and used. I am told that a team is preparing to make underwater observations, including marine life, continuously for six weeks submerged in the Red Sea.

Much work is being done on the sounds that fish make when they are feeding or mating. I have seen moving pictures of carp moving towards a man-made noise like that which the fish make when they are feeding. Perhaps a similar lure of the mating call, such as they use when hunting ducks and moose, would be more effective. However, I have always thought this a bit of a mean trick!

Certain of the papers which you will be dealing with read like science fiction -- but the methods proposed all seem to be possibilities and are based upon proven scientific principles. It may indeed be possible to detect fish by unmanned apparatus, to herd them like one does cattle and then to fence them in and to harvest them at will.

Perhaps the day will come when most of our conventional methods will be replaced with these entirely new ways in which the so-called "brain" of the calculators, and even satellites, play their part in relaying messages to land-based centres for re-broadcasting to fleets at sea.

But all this will take much scientific work -- expensive work too. The problems are becoming too big for individual attack and more and more it will call for team work. We should like to look forward to cooperation of interested countries with each other, saving expense and sharing their genius. Skilled and imaginative scientists are rare.

There is one other matter which I think will be of growing importance. That is, what are the costs of using all these improvements? We shall have to get more knowledge of this so that we may examine economic efficiencies. We shall have to put fisheries economists to work. I hope it will be done so that we can make this risky business a little less risky.

But, Mr. Chairman, I think the attention of the participants in this Congress and of the industry generally should be drawn to another thing -- to the consequences of all these improvements in the art which is becoming the science of fish catching. The more successful we are, the more it will be necessary to pay attention to conservation; the more essential it will become for nations to get together, to agree to a wise management of the exploitation of the resource to the end that we may getsustained yields, protect our investment and look after posterity. We may have to re-examine some of our basic concepts in order to bring this about. Technology is changing life in the world very rapidly and it will be necessary for us to adjust ourselves to those changes if we are to live as fully as might be.

Given the proper support, FAO can assist in bringing this about, not only by convening this sort of congress, but also by making the general public aware of the real nature of the problem of freeing the world from hunger.

And now Mr. Chairman, My Lord, Ladies and Gentlemen, I know that you have a heavy agenda and so I will close by extending the Director-General's wishes for a most successful meeting, in which I heartily join him.

2. THE LORD ST. OSWALD, M. C. Joint Parliamentary Secretary to the Ministry of Agriculture, Fisheries and Food, representing Her Majesty's Government in the United Kingdom

Your Excellencies, Ladies and Gentlemen:

The fishing industry in these Islands has a long and eventful history and many international meetings have taken place in London. But, during the whole of that history, this is the first international congress to meet in Britain with fishing gear for its theme. When Her Majesty's Government learned that the Food and Agriculture Organization was planning to hold a Congress on Fishing Gear we were very ready and very glad to invite it to London, being conscious of the interest and importance of the subject, and wishing to show our high appreciation of the fine work being done by the Organization and by its Fisheries Division in particular. I have, therefore, good cause for satisfaction in extending a most cordial welcome by Her Majesty's Government to all who are taking part in this, the Second World Congress on Fishing Gear.

This year the Freedom-from-Hunger Campaign is reminding humanity that a large part of the world's population are in drastic need of more food and better food. It is the task of FAO to seek the means of satisfying this great need, and in many parts of the world the exploitation and development of fisheries is one of the most promising and productive sources of the protein in which many millions of human diets are lacking.

This Congress intends to stimulate the flow of practical ideas to enable countries where modern techniques are as yet little known, and where elaborate costly equipment cannot be afforded, to increase their supplies of fish.

In other countries the problem is not so much to catch more fish as to catch it with increasing efficiency and at lower cost.

But whatever the problems that individual countries are facing, all will have something to learn from the discussions taking place in London this week. There will be more than discussions. At this week's exhibition at Earl's Court you will see all the latest equipment of many kinds which is manufactured in this country for the fishing industry. I understand also that a programme has been arranged to visit many of the places where this equipment is made.

I hope that, apart from this, many of our visitors after their week in this building will leave London, and visit some of our ports, large and small, where fishing is carried on.

I hear that, as often happens at such congresses, there are more papers than can be adequately discussed; but I am sure that under the able guidance of Dr. Finn and Mr. Harper Gow and the chairmen of the sessions your time will be used to the best advantage. Ladies and Gentlemen, I will take up no more of that time myself this morning. I bring my speech to an end and formally open the Congress, wishing it complete success and all of you a rewarding and enjoyable stay in this country.

3. L.M. HARPER GOW General Chairman of the Congress

Lord St. Oswald, Dr. Finn, Ladies and Gentlemen:

First of all, on behalf of the participants in the Congress, I must thank you, Lord St. Oswald, for honouring us with your presence at the opening ceremony and, through you, My Lord, may we convey to Her Majesty's Government our sincere appreciation of the excellent accommodation provided for us at Church House. I can assure you that the facilities offered will be fully utilised, and that they will greatly contribute to such success as we may achieve during this Congress.

Dr. Finn, thank you, Sir, for your kind remarks to me which I sincerely appreciate, and would you please convey to the Director-General our gratitude to FAO for having convened this Second World Fishing Gear Congress.

The large number of participants assembled here today from many different countries provides ample proof of the importance the fishing and fishing gear industries of the world attach to this Congress.

Ladies and Gentlemen, participants in this Congress, thank you for your attendance here today. FAO have convened this Congress and Her Majesty's Government have provided us with this splendid hall and other accommodation, but of course the ultimate success of the Congress depends upon you. You have come here to pool your individual knowledge and experience for the greater benefit of all concerned with fishing and what goes with fishing. If during the course of this week you are prepared, as I am certain you are, to contribute fully and candidly to the debates and discussions which are held on the subjects about which you are expert, the success of this Congress will be assured.

This is emphatically an industrial congress, attended by businessmen. Let us have, then, a business-like Congress.

We have a great deal of work to deal with so let us ensure that our sessions start promptly and punctually, even if they end late.

Let us try to avoid unnecessary repetition and devote the time we have available to the flesh and bones of the problems we are discussing.

Let us try to avoid blatant advertisement, yet be flexible and tolerant in this to a reasonable degree, realising that we are dealing with practical problems and practical fishing gear.

Let us remember that in the end our papers and our discussions will be recorded in a second volume of Modern Fishing Gear of the World, and try to ensure that the volume is a worthy record of this Congress.

There is some general information which I want to give you now because it will be helpful to you. You have all got a copy of the program which sets out clearly the various items of the agenda, and the main papers for discussion.

Each session will be provided with a Chairman and a Rapporteur. It will be the job of the Rapporteur to open each session with a brief and expert resumé of the main points brought out in the papers under discussion. It will not be necessary, therefore, for participants to read their papers through. Indeed there will be no time to allow this. Rather, the authors should expand on their themes and the rest of us should contribute to those ideas. At the end of each session the Rapporteur will summarise the discussions that have taken place.

Everyone with something to contribute is encouraged to do so. Speakers must first catch the Chairman's eye and obtain his consent to speak. They must then go to the nearest microphone, announce their name and country to identify themselves, and then speak clearly and not too fast, in order that all may hear and the interpreters can do their job efficiently.

To avoid delay, therefore, it would be helpful if participants who intend to make an important statement at any particular session, seat themselves as near as possible to one or other of the standing microphones stationed round this hall.

Finally, the Government, The Corporation of London, the British Trawlers' Federation, and many important companies have arranged receptions and cocktail parties for you throughout the week. I have no doubt that you will avail yourselves freely of this hospitality for it is not only in the debating hall, but also very much at these enjoyable parties, that we can meet together and continue our discussions. I can, of course, assure you that, whereas statements made in this hall will all be recorded, tape machines will not be in operation at the parties!

In conclusion, may I suggest that we all express our appreciation to Lord St. Oswald for honouring us with his presence here today and opening the Second World Fishing Gear Congress — after which there will be a short recess of ten minutes and we will then start work.

Thank you, Lord St. Oswald.

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Appendix IV

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Congress Secretary	Hilmar Kristjonsson
Technical Secretary	Pierre Lusyne
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Agenda item: 1. MATERIALS

Chairman: Andres v. Brandt

Rapporteurs:

1.1	Netting twines: Standardization of terminology and numbering systems	Gerhard Klust
1.2	Standardization of testing methods	
1.3	New net materials	Pierre Lusyne
1.4	Lines and ropes	J. Reuter
1.5	Knotless nets	
1.6	Monofilament nets	

Agenda item: 2. GEAR AND FISHING

Chairmen: L.M. Harper Gow
R.K.N. Ocran
Arni Fridriksson

Rapporteurs

2.1	Stern trawling	Robert F. Allen
2.2	Bottom trawling with high opening nets or low- and wide-opening nets	A. R. Margetts
2.3	Midwater trawling	J. Schärfe
2.4	Gillnetting	Jean Frechet
2.5	Longlining	
2.6	Traps, pots and dredges	

Agenda item: 2. GEAR AND FISHING (continued)

2.7	Purse seining	Edward A. Schaefers
2.8	Deck machinery	
2.9	Controls	
2.10	Fish detection	R. E. Craig
2.11	Fleet operations	Gordon C. Eddie

Agenda item: 3. GEAR RESEARCH

Chairman: Andrew W. Anderson

Rapporteurs:

3.1	Mechanical and hydrodynamic theory	W. Dickson
3.2	Instrumented gear testing	
3.3	Fish behaviour studies	J.H.S. Blaxter
3.4	Application to fisheries of recent advances in telemetry, computer science, etc.	Dayton L. Alverson
3.5	Future outlook. Gaps to be filled in gear research	

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Appendix V

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